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(57) Abstract

SUBJECT It is in detecting the amount of rotation gaps of the form of the image between pictures in a series picture of an imaging device or an input device, and amending the position of a rotational image.

Means for Solution Coordinates of form on a screen which extracts form from a specific color information of an image pick, a position of the center of gravity, By carrying out coordinate correction to a normal coordinate with the amount of rotation gaps of an amount detection means of the 1st rotation gaps to detect the amount of rotation gaps of form produced by the 1st tailing means following based on form of a standard of the 1st standard setting means set up as a standard for following the features, such as a direction, the rotational image is indicated by an erect image.

Claim(s)

Claim 1 An image display device comprising:

An imaging means which changes an optical image into an electrical signal and outputs picture information, or an input output means which inputs and outputs a series of picture information.

A form extraction means to extract form which detected luminosity of a color set in outputted image information from said imaging means or said input output means, and said color set, and was obtained according to specification within the picture.

The 1st standard setting means set up as a standard for following the features, such as a position of coordinates and the center of gravity, and a direction, in form on a screen obtained by said form extraction means.

The 1st tailing means that follows extracting the same form as form of a standard specified by said 1st standard setting means, a specific point from the center of gravity of form on a screen obtained by said 1st standard setting means or said 1st tailing means -- or, Based on a direction detected from form of a standard specified by the 1st direction detecting means that detects the direction of a specific straight part, and said 1st standard setting means by said 1st direction detecting means, The 1st amount detection means of rotation gaps that detects the amount of rotation gaps with a direction detected from form extracted by said 1st tailing means by said 1st direction detecting means, the center of gravity of form on a screen obtained by said 1st tailing means based on the amount of rotation gaps of said 1st amount detection means of rotation gaps -- or, The 1st coordinate correction means that obtains an outputted image which made coordinates on a screen agree in the form direction of a standard spin-compensation-specified by said 1st standard setting means centering on an intersection of said specific straight part, or an intersection on a straight line of said specific straight part, The 1st recording device that records an outputted image of said 1st coordinate correction means, or the 1st displaying means to display.

Claim 2 When the same form as form of a standard which set up by said 1st standard setting means, and was extracted in an image display device indicated to Claim 1 of Claims moves to a specified specific region on a screen, Or form which newly serves as a standard at a place other than a place which form which moved occupies when more than a stipulated amount moves is specified, Coordinates of form used as said specified new standard, a position of the center of gravity, a direction, etc. are set up as a new standard, when the same form as form specified as said form which newly serves as a standard moves to a specified specific region on a screen, A re-setting means of a standard which repeats further setting-operation which specifies said form which newly serves as a standard when more than a stipulated amount moves, The 2nd tailing means that follows the same form as form of a standard specified by said 1st standard setting means and a re-setting means of said standard, a specific point from the center of gravity of form on a screen obtained by said 1st standard setting means, re-setting means of said standard, and said 2nd tailing means -- or, Based on the direction of form of a standard specified by the 2nd direction detecting means that detects the direction of a specific straight part, said 1st standard setting means acquired by said 2nd direction detecting means, or a re-setting means of said standard, The 2nd amount detection means of rotation gaps that detects the amount of rotation gaps of the direction of form on a screen obtained by said 2nd tailing means, the center of gravity of form on a screen obtained by said 2nd tailing means based on the amount of rotation gaps detected by said 2nd amount detection means of rotation gaps -- or, The 2nd coordinate correction means that obtains an outputted image which made coordinates on a screen agree in the form direction of a standard spin-compensation-specified by said 1st standard setting means centering on an intersection of said specific straight part, or an intersection on a straight line of said specific straight part, An image display device consisting of the 2nd recording device that records an outputted image of said 2nd coordinate correction means, or the 2nd displaying means to display.

Claim 3 In Claim 1 of Claims, and an image display device indicated to Claim 2, a direction setting-out means of an image to set up an image display direction of said 1st and 2nd displaying means, and an output of said direction setting-out means of an image and said 1st amount detection means of rotation gaps -- or, A calculating means which inputs an output of the 2nd amount detection means of rotation gaps, and an output of said

direction setting-out means of an image, and calculates a display direction, An image display device consisting of the direction compensation means of an image which amends an image display direction with an output of said calculating means, the 3rd recording device that records an outputted image of said direction compensation means of an image, or the 3rd image display means to display.

Detailed Description of the Invention

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Field of the InventionThis invention relates to signal processing, such as taken images, such as an electronic "still" camera or a video camera, or a series of recorded images, detects change of direction of the specific object image in a screen, and relates to the image display device which amends the hand of cut of a display image and is used as an erect image.

0002

Description of the Prior ArtAs an example of the image display device which can change the display direction of the conventional picture, setting up an image display direction by an operator's key operation is shown in JP,H5-35364,A.

0003In JP,H7-168529,A, two or more photo sensors are arranged to the periphery of an image display device, an operator's position over said display device is detected, and control of the image display direction is performed so that the display of the display device always seen from the operator may be an erect image.

0004

Problem to be solved by the inventionHowever, although the image display device of the above conventional technologies detects the direction which should correct a display by the key operation by an operator, movement to a photo sensor, etc. and the direction of image display is set up according to the detected direction, that case where a high speed response is difficult exists constitutionally. The gravity sensor for gravity direction detection is formed in the display device of a portable information-and-telecommunications machine, and these people propose the image display device which controls an image display direction by the output of the gravity sensor as JP,8-319069,A is shown.

0005As an example of this gravity sensor, it is less than the inner capacity of a container, seal a conductive liquid hermetically in a container, and the stabilized character where that conductive liquid moves in the gravity direction is used, There is composition which detects the conduction by contact with the electrode which were beforehand provided in the circumference in a container, and which faces, and the conductive liquid located in the stable place, and non-contact, and non-conduction, and detects angle of rotation. In order to amend a hand of cut centering on the optic axis of this camera, when the angular velocity of rotation of a picture makes it correspond to about 1 rotation / 1 second, i.e., frequency, if it is about 1 Hz or less, can follow in the display device using a gravity sensor, but. There is a fault beyond it it becomes difficult to answer if high-speed on the structure of a sensor.

0006In recent years, in a video camera, an electronic "still" camera, etc., a camera part and a display are separated and the camera of composition of having connected them with the exclusive cable is put on the market.

0007These place a display at hand, and a camera part is moved to a free position, and the photography person can take a photograph from a legible direction.

0008However, in such composition, the movability of a camera part is good, and since it can be freely rotated by it also to the optic axis of a lens, it tends to rotate a taken image. Therefore, he takes a photograph, performing operation which is corrected in the direction of the image of the original erection, even if a camera operator takes a photograph so that a camera may not be rotated as much as possible, or he rotates, looking at the display of a picture. However, since the camera operator cannot see for example, when a camera operator and those who observe a display are another, control of the angle of image rotation is difficult and the size and its speed of the angle to rotate are easily changed to unspecified.

0009Therefore, when the gravity sensor mentioned above amends, depending on camera operation, the speed of rotation of a camera may rise easily, and the high-speed field which cannot be amended may occur for a gravity sensor. For this reason, follow operation becomes poor, rotation of a picture arises, and it will be hard coming to see. When it gazes at the image to rotate and follows, falling into the situations, like a temper worsens is also considered.

0010This invention is solved and such a conventional fault to the observer of a display screen on a screen, Make the direction of the form of an image where the specific color specified as a standard stood erect into the standard of the direction which fixes rotation, and the amount of rotation gaps of the direction in the form which followed extracting the form specified as this standard is detected, Spin compensation of the coordinates of the screen is carried out, and it aims at providing the composition which realizes the display of the image which stood erect continuously to the display screen.

0011

Means for solving problemAs for this invention, an erect image sets the position of an imaging device as a display screen in photography to achieve the above objects that it will be obtained. next, the observer of a display screen -- the same period as observation -- or, It has a form extraction means to extract the binary-ized form of the erect image which the observer specified in real time, by specifying the color of an erect image before it, distinguishing the luminosity corresponding to the color of this specified erect image, and extracting the pixel of the color corresponding on the imaging screen, and luminosity. The standard setting means which specifies the features, such as coordinates of the form on the screen obtained by this extraction, a position of the center of gravity, and a direction, as a standard for following, and sets them up, the specific point from the center of gravity of a tailing means to follow in real time extracting the form of this set-up standard, the form of said set-up standard, and the same form produced by following it -- or, An amount detection means of rotation gaps to calculate the difference of angle of rotation with the same form produced by following with the form of said standard by the direction of a specific straight part, and to detect the amount of rotation gaps of a picture, The compensation means which performs spin compensation of the picture in a pixel unit in the form direction of said standard with this detected amount of rotation gaps, and a means to display record or a correction picture for the outputted image from a compensation means, and to always give an observer an erect-image display constitute invention.

0012The case where the same form produced by following a nominal contour moves to the specific region on a screen in order to correspond to panning etc. widely, When predetermined movement magnitude is detected, the form used as another new standard is extracted in the camera move direction, The re-setting means of the standard which repeats the operation which sets up on the basis of the features, such as coordinates of the form on the screen obtained by that extraction, a position of the center of gravity, and a direction, and sets up this new standard, The 2nd amount detection means of rotation gaps that detects the amount of rotation gaps from the 2nd tailing means that follows extracting the form of said standard, the form of a still newer standard, etc., the same form produced by following, and the form of the standard at the time of being set up, and the 2nd compensation means that performs spin compensation of a picture based on said amount of rotation gaps. A means to display record or a picture for it and to always give an observer an erect-image display constitutes invention.

0013This invention is applicable not only in the image input from the camera which the photography person holds. Then, even if the target pictures are a series of outputted images recorded on recorded image equipment from an electronic "still" camera, an ultrasonic scanner, an X ray camera, etc., The input output means which inputs these and is outputted after that is established, and the picture through this as well as **** is processed, and is made the composition which always displays an erect image on an observer.

0014Apart from rotation of the picture by rotation of an imaging device, it also assumes that a display device and an observer's position change, and it is amended. therefore, the case where the display surface of a display device rotates 90 degrees individually -- the rotation -- hand control -- or, The rotation directing means which is detected automatically and directed is established, the amount of rotation gaps of the picture processed like **** next and the rotation of said rotation directing means are inputted, and it has composition which has a calculating means which outputs the operation output amended by said compensation means so that an erect-image display may always be performed to an observer.

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Mode for carrying out the inventionA 1st embodiment of the image display device of this invention is described below. Drawing 1 is a block block diagram showing a 1st embodiment.

0016In the figure, the optical system section which leads the light in which 1 let the lens pass to an image sensor, and 2 are image sensors which change a lightwave signal into an electrical signal, and are taken as CCD here. CDS in which 3 reduces the noise of an image sensor, A/D from which four change an analog signal into a digital signal, The camera signal processing part which 5 divides digital image data into a color and luminosity, and is processed, Frame memory FM which 6 comprises RAM (Random Access Memory) and records a frame image, RISC-CPU which 7 performs operation of each part, and control and transmission and reception of data, and performs programing operation at high speed, The 1st standard setting means which 7a specifies the form extracted first as a normal coordinate, and is set up, 7b judges the form set as the normal coordinate, and the form of the same area on a screen, A 1st tailing means to follow the form of a standard, and 7c build in the 1st direction detecting means etc. that detect the direction of the center of gravity of the coordinate value of the nominal contour of the 1st standard setting means 7a to a specific point, and the center of gravity of the coordinate value of the output form of the 1st tailing means 7b to a specific point, An amount detection means of the 1st rotation gaps to calculate the amount of rotation gaps of the tailing form to a nominal contour from the detecting direction, a 1st coordinate correction means to perform 7 d of coordinate correction of the output form of the 1st tailing means 7b from the amount of rotation gaps of the amount detection means 7c of the 1st rotation gaps, a form extraction means by which 8 extracts the luminosity of a color set and its color set, and the picture, by which 10 was processed -- the writing to an image memory -- or, It constitutes from an

electrochromatic display displaying means which the memory control which controls read-out etc., the image memory which records the picture which carried out coordinate correction of 11, the key as which 14 expressed various kinds of operator guidance keys to one, and 15 make a remote control receiver and to which 16 carries out the color image display of the video signal.

0017Next, operation is explained. The light figure from the optical system section 1 is received by CCD2, and it is changed into an electrical signal. The signal outputs the signal to which the noise decreased by CDS3, inputs it into A/D4, and an analog video signal is changed into the digital video signal S0. The transform signal S0 is inputted into the camera signal processing part 5, and a compensation process is carried out by the control signal S1 from RISC-CPU7, and it outputs the digital video signal S5 delayed for digital video signal S4 and its data S4 of the data 1H. RISC-CPU7 inputs the indication signal of the key 14 or the remote control receiver 15 which receives the signal of an unillustrated remote control, and it performs directions of operation to each part. The reference clock signal with which the output signal S3 of the camera signal processing part 5 sets up the operation timing from said image sensor CCD2 to A/D4. The output signal S2 is a signal which controls said optical system section 1.

0018Next, the form of the erect image in a photography screen is extracted, and the operation which specifies the form which serves as a standard out of the extraction form is described. Said image sensor 2 is fixed to the position (position which is visible to erection) from which an erect image is obtained, and one output digital video signal S4 of said camera signal processing part 5 is inputted into the form extraction means 8. Form is extracted by distinguishing and binary-izing the level of the luminance signal of the color by the color specification from RISC-CPU7. The form extracted by this is the data constellation corresponding to the position of the pixel on the photography screen which has the specified color by which 1 and 0 were binary-ized. The binary-ized data is inputted into RISC-CPU7.

0019As an example of how to specify a color, the key which is equivalent to each color in the key 14, for example may be chosen, and the color of form to specify may be inputted. Or using the composition of color extraction of a form extraction means 8 to explain to details later, the simultaneous comparison of 12 colors - the 126 colors is carried out for the color of only a middle-of-the-screen part in parallel, and it may be made to make the color of the decided result into a color set automatically.

0020The flow chart of the typical figure of drawing 3 a and drawing 7 - drawing 9, etc. explain operation of RISC-CPU7 below. If said binary-ized data is inputted into the 1st standard setting means 7a, in the 1st standard setting means 7a, all the positions of the extraction form of a color set will be recorded as coordinates on a screen, and operation specified on the basis of one form of them will be performed. Since there is the necessity that Step 801 of drawing 7 performs first setting-operation of the form which becomes a standard, the frame flag P which shows the directions is set to 1. Next, it shifts to Step 802 and the coordinates on the screen of an extraction-shaped perpendicular direction are set up.

0021In drawing 3 a, the address of the lengthwise direction to the bottom is obtained from on on a screen.

0022In order to set up this address, the Vertical Synchronizing signal and Horizontal Synchronizing signal which are outputted continuously are used. Usually, when obtaining the video signal picturized with the interleave scanning mode, the Vertical Synchronizing signal and Horizontal Synchronizing signal of a circuit also support the interleave scan. Then, using this, it supposes that the trailing edge edge (it is the same as that of a rising edge and the following when it is considered as the driving signal of negative polarity) of a Vertical Synchronizing signal, and the front tip edge (falling edge) of a Horizontal Synchronizing signal are in agreement, and an odd number field explains hereafter.

0023V counter is started from the trailing edge edge of a Vertical Synchronizing signal, a count is started with the trailing edge edge (rising edge) of the Horizontal Synchronizing signal, it counts with the both-edges edge of a Horizontal Synchronizing signal after that, and a count is stopped with the front tip edge of the following Vertical Synchronizing signal. It aims for this to complete all the extracting processings with one frame. It is for making it make each horizontal line and each counter value which the interleave scan was carried out and have been arranged correspond, when odd number is obtained in the odd number field, the counter value of even perpendicular directions is acquired in the even number field and one frame is completed.

0024Since horizontal binary-ized form is outputted by this operation after the trailing edge edge of a Horizontal Synchronizing signal counts (odd number), if counted value when extraction form is detected is memorized, the position of an extraction-shaped perpendicular direction will become clear.

0025In drawing 3 a, the transverse direction from the left of a figure to the right is assumed as horizontal.

0026Next, in an even number field, since the trailing edge edge of a Vertical Synchronizing signal and the front tip edge of a Horizontal Synchronizing signal are not in agreement, V counter is started from the trailing edge edge of a Vertical Synchronizing signal, a count is started with the front tip edge of a Horizontal Synchronizing signal, it counts with the both-edges edge of a Horizontal Synchronizing signal after that, and the value of even counters is generated by stopping a count with the front tip edge of the following Vertical Synchronizing signal. Since horizontal binary-ized form is obtained after the trailing edge edge of a Horizontal Synchronizing signal counts (even number), the position of an extraction-shaped perpendicular direction becomes clear by memorizing

the counted value at that time.

0027The address which the address which counted the coordinates on the screen of the above perpendicular direction of the frame image of No. odd to the oddth was obtained, and counted the coordinates on the perpendicular direction screen of a frame image of No. even to the eventh is obtained, and processing of record of the coordinates of the perpendicular direction on the screen by which the interleave scan was carried out is performed.

0028In Step 804, in order to obtain the address of the transverse direction from the left of the drawing 3 a screen to the right, H counter is started from the trailing edge of the Horizontal Synchronizing signal of the video signal of said form, the clock corresponding to the picture element on a screen is counted, the standup of said binary-ized data and the counter value of a falling edge are recorded, and it is made the horizontal coordinate value on a screen. Reset of this H counter is performed with the front tip edge of the following Horizontal Synchronizing signal.

0029In Step 805, the coordinate value of the binary-ized form which made the lot the value of H counter which packed and extracted the coordinate value of the form extracted from Step 802 having applied to Step 804, and the value of V counter at that time is recorded on RAM1 (not shown) of RISC-CPU7. That is, the value of the direction of V of the horizontal line which has form as data of a binary-ized-shaped field, and the value of the direction of H of the both ends on a horizontal line with form are recorded.

0030As mentioned above, the video signal of an interleave scan, Since one frame is the 2 fields, and counted V counter value of perpendicular direction coordinates to the oddth in the odd-numbered field and counted it to the eventh in the even-numbered field, By rearranging V counter value from both the fields in order, the table of the value of the data constellation of the coordinate value of the extraction form shown with the value of the perpendicular direction in the picture of one frame and the horizontal value from said H counter value, i.e., extraction-shaped coordinates, is obtained on RAM1.

0031By the following step 806, the form extracted on the screen distinguishes that it is the form which has 1 lump's field. For this reason, it distinguishes by whether the field on the horizontal line detected as binary-ized data between the horizontal lines of the adjoining upper and lower sides on a screen based on specification of a color has touched mutually.

0032Now, the horizontal line in the midst of processing is made into the present line now, the horizontal line in front of one will be called a preceding line from this, and it explains still in detail hereafter.

0033First, when the extraction region on the horizontal line shown with the value of the both ends of the extraction form which recorded the point on the present line is in contact with either of the extraction regions on the horizontal line shown with the value of the both ends of the extraction form which recorded the point on a preceding line, it judges with 1 lump's field.

0034When a value of both ends of an extraction region of the present line is contained for one of the two or both to both ends of which field of an extraction region of a preceding line as for a judgment of whether to have touched, Or if a case where a value of both ends of which field of an extraction region of a preceding line is contained between values of both ends of an extraction region of the present line is detected, it can judge easily.

0035When it judges with there being a field which has touched after judging in this way, it judges with a part of identical shape, and the same label as a field of a preceding line is attached by the following step 807, and when shift and there is nothing to Step 808, it shifts to Step 808, without doing anything.

0036Although an extraction region is located on the present line, when there is no extraction region in a preceding line, after attaching a new label, it shifts to Step 808.

0037It returns to said step 802, the same operation is continued again, and coordinates recording processing of total extraction form is ended until it detects an end of one frame. Pretreatment judges the frame counter P= 1 of detection directions of a nominal contour by the following step 809. The label A is attached and recorded, in order to be set to YES, to shift to the following 810 and to show a normal coordinate for a coordinate value of form near the middle of the screen of a directions color part in RAM2 (not shown) of RISC-CPU7, since P= 1 is set up first. Since a setting-out completion flag of a normal coordinate was set as the normal coordinate F= 1 and setting out of a nominal contour was completed, it changes into the frame counter P= 2 from said frame counter P= 1.

0038Here, although a coordinate value for form detection of a portion of a color set is set up near middle of the screen, it may not limit to this and another portion, for example, form from a right end of a screen, may be sufficient. Although mentioned later for details, to set up a specific field and perform special processing there, it is necessary to avoid that place but, and if it becomes except that specific field when it is this processing, it is good anywhere on a screen.

0039Next, although it shifts to the 1st tailing means 7b shown at Step 902 of drawing 8, Since said processing is the processing which specifies form of a standard and was set as the normal coordinate F= 1, a judgment of being the normal coordinate F= 1 of Step 901 is set to YES, and shifts to Step 904 of the 1st following direction detecting means, without performing tailing processing.

0040In processing of this step 904, a coordinate value of the center of gravity of a nominal contour which recorded coordinates previously is calculated by calculation, and a coordinate value of the longest point from the

center of gravity or the shortest point is calculated and calculated. In order to calculate a coordinate value of the center of gravity, coordinates of level and a perpendicular direction of a field where extracted form exists, for example are integrated over the full screen, and it asks by dividing by a pixel number of the existing field. Centering on the center of gravity, an angle with specific points, such as the shortest point or the longest point, is calculated from the horizon, and the result is recorded on said RAM2 as a degree of reference angle which performs an erect-image display.

0041Since it becomes the processing instruction of tailing form from a magnetic field, in order to show the directions, it is set as the normal coordinate $F = 0$.

0042In the above explanation, since the computation from centroid calculation to angle calculation is the simple computation based on the coordinate value of each pixel, it can be performed in a short time. What is necessary is to judge the next picture and just to set up processing change a normal coordinate into form with the longest point or the shortest point, when extraction form has a round shape, an object form, etc. and can calculate neither the longest point nor the shortest point.

0043Since the above processing is processing which specifies form, processing of the frame image before the frame image which is performing the present processing is omitted. Therefore, at Step 905 of the amount detection means 7c of the 1st rotation gaps, it becomes zero, and passes, without processing in Step 1001 of the 1st coordinate correction means 7d of following drawing 9, and the amount of rotation gaps shifts to the processing which records an extracted image on the image memory 11.

0044Here, the detailed circuitry of said form extraction means 8 is explained below using drawing 2. The standardizing part in which 21 standardizes the degree of saturation of a color, and 22 and 23 are directions of the color from RISC-CPU7 grade, and it is the extraction part A which judges the level of the luminosity which has an ingredient of a color according to directions of the color, and performs binary-ization, and the extraction part B. 24 and 25 are the logical addition parts A which carry out OR operation and the logical addition parts B of a digital signal. 26 and 27 consist of filter part A which outputs a 1-pixel digital signal by the majority decision of 3*3-pixel digital binary-ized data, and filter part B.

0045Next, operation is explained. The luminosity of digital video signal S4 and a chrominance signal are inputted into the standardizing part 21, and standardize the degree of saturation of a color. If the standardization signal is simultaneously inputted into the extraction part A22 and the extraction part B23, the binary signal based on the specified color will be outputted by distinguishing and binary-izing the level of the luminosity which has a color specified from RISC-CPU7.

0046For example, if four colors are specified simultaneously, the binary signal of four specified colors will be outputted from the extraction part A22 and the extraction part B23. The binary signal compounded based on four specified colors is obtained, respectively by inputting and carrying out the logical sum of these four binary-signal outputs to the logical addition part A24 and the logical addition part B25. The output is inputted into the filter part A26 and the filter part B27, and a noise is removed and it inputs into said RISC-CPU7. Thus, the binarization processing of form which carried out color specification can carry out to real time by easy hard circuitry.

0047On the other hand, the output digital video signal S5 (you made it delayed 1H here for delay doubling of signal processing) of said camera signal processing part 5 is inputted into frame memory FM6 via the memory control 10, and the picture information for one frame is stored temporarily.

0048As mentioned above, since a frame image **beginning**, here an extracted image inputted into RISC-CPU7 in a time of setting up a normal coordinate, It memorizes then and the image memory 11 of a memory address which is equivalent to coordinates on a screen of said extracted image in a picture of frame memory FM6 by the memory control 10 memorizes.

0049an access path of frame memory FM6 or the image memory 11 -- that is, Courses, such as writing of data transmission-and-reception timing to a memory or the memory, read-out directions, and a call of a memory address, are explained as what overlaps with a course of the digital video signal S6 or the digital video signal S7.

0050Next, if a frame image is newly obtained from said camera signal processing part 5 by the digital video signal S5, image data before **one** recording on frame memory FM6 will be replaced with frame image data which might be new.

0051In order to double delay produced when performing signal processing, such as extracting processing, to the digital video signal S5 which is a new frame image from said camera signal processing part 5, suppose that digital video signal S4 will input only 1H into the form extraction means 8 early here, but. Form binary-ized based on a color specified based on this digital video signal S4 as the point is extracted, and this data is inputted into the 1st standard setting means 7a of RISC-CPU7.

0052Although the coordinates on the screen of the form set as the standard change with camera movement, recording processing of all the coordinate values of the extracted binary-ized form is performed like the above-mentioned for every frame, and the result is recorded on RAM1 of RISC-CPU7.

0053Now, next, when it has returned to processing of drawing 8, since it is set as $F = 0$ at Step 904 to have described above, the judgment of the normal coordinate $F = 1$ in Step 901 shifts to the 1st tailing means 7b which is set to NO and shown at Step 902. Then, out of RAM1, the form of an area equivalent to the shaped surface

product set as the standard of said RAM2 label A is searched, the form produced by searching is judged to be the same form as a nominal contour, and this is recorded on RAM3.

0054When there is two or more form of an equivalent area at this time, as a simple discriminating means, The form of the position nearest to the position in which the thing nearest to origin could be chosen as, and the last extraction form existed the maximum of the size of horizontal and a perpendicular direction may be chosen, and what may be judged with pattern matching still more nearly eventually is omitted for details, although it is needless to say.

0055Now, a coordinate value of a point of the shortest or longest distance is obtained from the center of gravity calculated from a coordinate value of a present frame picture by Step 903 which shows operation of the 1st following direction detecting means, and its center of gravity, and an angle centering on the center of gravity is calculated, and it is recorded on said RAM3. Since it becomes the directions which make tailing form process next time also, it is set as the normal coordinate $F = 0$ for the directions.

0056Next, in Step 905 which shows operation of the amount detection means 7c of the 1st rotation gaps, the center of gravity of said RAM3 to a preceding frame image, and the shortest point -- or, Since the longest point is acquired, a value of quantity in which a picture carried out parallel translation is obtained from a difference of a coordinate value of the center of gravity of each form stored by RAM2 and RAM3 based on the center of gravity, the shortest point, or the longest point of a nominal contour of the label A. **of Step 904 of RAM2** The direction of the shortest point or the longest point, i.e., a value of an angle, is acquired from the center of gravity of a coordinate value of the shortest point from the center of gravity of RAM2 and RAM3, or the longest point, and a coordinate value of the center of gravity to each form. A difference of a frame of form of a standard and an angle between extraction form of a present frame picture, i.e., angle of rotation, is acquired, and this becomes the amount of rotation gaps from these.

0057Thus, based on a value calculated with coordinates on a screen, the amount of rotation gaps of a present frame picture of identical shape can calculate in a short time.

0058Here, a part of form becomes a shadow gradually, and when missing, tailing becomes impossible **form which has followed noting that it is the same form as form set as a standard moves, and** . In that case, it cannot be overemphasized that what is necessary is just to have operation permitted even if form set as a standard is updated with 2 - 3 frame interval, and a difference in form which changed gradually is decreased and there is quantity of a difference a little, and composition.

0059Next, by the 1st coordinate correction means 7d which shows operation at Step 1001 of drawing 9, the amount of rotation gaps from the center of gravity is calculated, and a coordinates recorded value of extraction form of a present frame picture is changed. Thereby, via the memory control 10, coordinates of only a part of the amount of rotation gaps are corrected centering on the center of gravity of a nominal contour, and it is recorded on the image memory 11 within a vertical-retrace-line period. It may deal with 1 pixel of rotation of a picture at a time as an example, and it may perform it centering on the center of gravity of RAM3.

0060Thus, the amount of rotation gaps is detected and amendment returned to an erect-image picture is performed by the processing which changes a coordinates recorded value with the value.

0061The above processing is performing operation holding direction of the picture first set as the standard, and when the output of the following frame image or subsequent ones continues these operations, rotation of the specific photographic subject on a screen can be oppressed, and the picture which always turns into an erect image can be displayed on continuation, and can be recorded.

0062When it does not exist on the screen which the address which it is going to change and amend recorded at this time, it cannot be overemphasized that what is necessary is just to amend by interpolating based on the image data of a present frame picture, but it omits for details.

0063Thus, even if a camera rotates freely in the picture in which the nominal contour of the set-up erect image exists, the data of the image memory 11 in which the video of the erect image was always obtained is recorded, and it displays by the electrochromatic display displaying means 16.

0064Although the hand of cut of the form set as the standard was always amended by the above explanation and rotation is prevented, Of course, by preventing rotation to rapid rotation, easing amendment to the rotation more than fixed, and performing operation of changing the angle of the standard of amendment itself, by amending gently and adjusting a correction amount, It cannot be overemphasized that it becomes possible to control the prevention from rotation with nature more.

0065Next, operation of drawing 1 is typically explained using drawing 3. Drawing 3 shows the picture from a camera and drawing 3 a - drawing 3 d show the case where a camera rotates.

0066The first drawing 3 a shows the image pick of a camera, and shows the case where the trees on a picture are judged as an erect image. On a screen, two green and brown colors are extracted simultaneously, and the luminosity edge which the big tree 31 and Ogi 32 binary-ized like drawing 3 b is extracted. In the figure, the 1st direction detecting means 7c detects the coordinates of the edge part of the extracted picture, and the center of gravity G1 is calculated like drawing 3 c. The longest point M1 is calculated from the center of gravity G1. In this example, the point which is most distant from the center of gravity from the ease of the explanation at the time

of using a figure is set up as a reference point for detecting a direction.

0067Based on the reference point of this extraction form, the angle K1 with the horizon passing through the line segment and the center of gravity G1 from the center of gravity G1 to the longest point M1 is calculated by the amount detection means 7c of the 1st rotation gaps. Next, a camera moves, and if it is on the monitor separated from the camera and the picture in the state where it rotated is observed, suppose that it came to be shown in drawing 3 d.

0068In this figure, although the big tree 31 is shown on Drawings as an erect image, This is erected, shows and assumes that the portion within the limit shown with the alternate long and short dash line as a taken image is photoed noting that a photographic subject does not move on the assumption that processing from the 1st standard setting means 7a to the amount detection means 7c of the 1st rotation gaps carries out, but a camera moves.

0069In this photoed screen, although the picture in the state where the form of two trees inclined aslant is acquired, the angle K2 with the horizon passing through the line segment and the center of gravity G2 from the center of gravity G2 to the longest point M2 is obtained based on this picture.

0070Next, by the 1st coordinate correction means 7d, the recorded value of the coordinates on a screen is changed and it is recorded on the image memory 11 so that it may be in agreement in the direction of **from the center of gravity G1 of front drawing 3 c to the longest point M1** in the direction of **from the center of gravity G2 of drawing 3 d to the longest point M2**. Since it is recorded in the same direction as the erect image (drawing 3 c) of the standard which the coordinates of the picture were amended like drawing 3 g by change of this coordinate value, and was set up first, an erect image is always displayed on the observer who looks at a display screen, and it is eventually recorded on him.

0071Thus, by the form same even if a taken image rotates as the photographic subject set up as a nominal contour extracting, and detecting the amount of rotation gaps, and amending based on it, A subsequent frame image as well as the first frame image that has the form set up as a standard can always perform the display of an erect image.

0072A nominal contour can be extracted in real time, and since composition is also easy, processing time also has an advantage, like it is short.

0073Although the picture of the rectangle obtained by photography is based on the form of the image pick-up area of said image sensor 2, the case where there is no picture in the corner section of said drawing 3 g may happen, it is black and it is shown typically. Since a pixel number is about 20% higher than the object for NTSC if the part is used as a generating picture portion for NTSC using the image sensor for PAL, although it for NTSC is used for said image sensor, only the part can decrease a black screen. ***** and also a black part can be lessened for the image sensor which the pixel number increased.

0074Here, image rotation processing is good in a line as follows. For example, it is considered as the standard of rotation of the coordinates of the extraction-shaped center of gravity, and the distance from the center of gravity of each picture element is computed, and it rotates from the center of gravity by the angle which rotated, and is considered as new coordinates, and the data of a picture element is moved to the coordinates. Centering on the center of gravity, the position of a picture rotates by the amount of rotation gaps by these operations, and the display of the picture which has always stood erect can be performed.

0075A series of picture information obtained with VTR, an ultrasonic scanner, and an X ray camera, Since it is the same video signal as the aforementioned taken image, an erect image can always be displayed by considering the output signal of the input output means (not shown) which inputs the picture information and is outputted after that as the same processing as the above, operation, and composition via A/D4.

0076Next, a 2nd embodiment is described below using drawing 4. In the figure, the same number shows the thing of drawing 1 mentioned above - drawing 3 and drawing 7 - drawing 9, and the function, and it omits explanation.

0077In drawing 4, including form of a standard of said 1st standard setting means, 7e extracts the same color or form of a unique new standard from somewhere else **form / same**, sets up a new normal coordinate, and is such a re-setting means of a standard which repeats operation of new normal coordinate setting out. 7 f of the same area as a shaped surface product of standards, such as said standard re-setting means 7e and said 1st standard setting means 7a, is judged, A 2nd tailing means to perform form tailing, and 7 g of the 2nd direction detecting means that detects the direction of a specific point is built in from the direction of the center of gravity of a normal coordinate value of said standard re-setting means 7e to a specific point, and the center of gravity of a coordinate value of output form of said 2nd tailing means 7f, An amount detection means of the 2nd rotation gaps to calculate the amount of rotation gaps from the detecting direction, and 7 h are 2nd coordinate correction means to perform coordinate correction of output form of the 2nd tailing means 7f from the amount of rotation gaps of said amount detection means 7g of the 2nd rotation gaps.

0078Next, operation is described. If form of a standard where it explained in said 1st embodiment operates a camera and moves to a bread or tilting directions, it may move in the bread or the direction opposite to the direction of a tilt, and, finally may disappear from a camera photographing screen. This embodiment is devised as

this measure.

0079First, the program flow of the standard re-setting means part 7e is shown in drawing 10. Since it is not the first processing in which a nominal contour is set up at Step 809 in the figure, the judgment of $P = 1$ which shows detection directions of a nominal contour is set to NO, and shifts to Step 812 of the 2nd tailing means 7f. The label A of RAM2 of Data Recording Sub-Division of a nominal contour and the form of an identical area are searched from RAM1, the coordinates are memorized on the label M of RAM1, and it shifts to Step 813. If the nominal contour of the label M of RAM1 arrives at the coordinate areas near one end in a screen at this step 813, it will shift to Step 814. The nominal contour of the label M is recorded on the label C of RAM2, the form of another new standard is extracted in the same color to middle of the screen or the end field by the side of the camera move direction, and as the label B of RAM2, it is recorded and is set as the normal coordinate $F = 1$ of a nominal-contour setting-out flag.

0080What is necessary is to set three kinds of colors as others, and just to extract the form of the same color, when there is no form of a setting-out color to the form of a new standard although Step 814 of the figure is not filled in at this time. It cannot be overemphasized that what is necessary is just to repeat color setting when there is no form of a setting-out color, and until it sets up another color and can check existence.

0081By replacing with the judgment of whether the position of the nominal contour of the label M of RAM1 in the judgment of the step 813 is in the coordinate areas near one end in a screen here, and detecting that the migration length of the straight line of form is more than a stipulated amount, it may be used to constitute so that a new photographic subject may be made into a normal coordinate.

0082Since it is shown that it shifts to Step 815 in NO, and tailing form is in the position near middle of the screen etc. by the judgment of the step 803, it records on RAM3 as tailing coordinates, and since it is not a normal coordinate, it sets to the normal coordinate $F = 0$, and it shifts to the 2nd direction detecting means of Step 901 of following drawing 11.

0083In the judgment of the normal coordinate $F = 1$ of Step 901, since **** from said step 814, it is set to YES, and it shifts to the judgment of the label B of RAM2 of the form of the new standard of Step 906.

0084Shifting to Step 907 of the direction of YES in the step 906, since it is the label B of RAM2 -- the longest point from the center of gravity of the labels B and C of RAM2, and the center of gravity -- or, The angle to the longest point or the shortest point is calculated centering on the center of gravity, it shifts to Step 908 of the following amount detection means 7g of the 2nd rotation gaps, and the angle-of-rotation difference R0 by camera rotation with the label A of RAM2 of said nominal contour and the label C of tailing form RAM2 is detected from the shortest point.

0085Since the label C of the tailing form RAM2 and the label B of form RAM2 of a new standard are in the screen, said angle-of-rotation difference R0 is calculated to the angle of rotation R01 of the label B of form RAM2 of a new standard ($R01 - R0 = RS$). The degree of reference angle of the label B of form RAM2 of the new standard which is an angle which is in agreement in the nominal-contour direction set up first is set as RS. By the judgment of said step 901, in NO, it shifts to Step 903 and Step 905, and the amount detection of rotation gaps of said tailing form is performed.

0086Next, shift to Step 1002 of the 2nd coordinate correction means 7h of drawing 12, and the form RAM2 label B of a new standard is judged, If YES becomes, it will shift to Step 1003, the coordinates of a picture will be changed in the direction contrary to the move direction of the angle-of-rotation difference R0 (angle which moved from the angle of the first nominal contour) centering on the center of gravity of the form RAM2 label B of said new standard (the label B of RAM2), and a picture will be amended to an erect image. The data of the label B of the RAM2 is transposed to the label A of RAM2, the data storage place of a nominal contour is set as one, and a nominal contour is changed into a new nominal contour.

0087If said step 1002 becomes in NO, the coordinates recorded value of rotation of the same form as a new nominal contour will be changed according to the angular difference R0 of the amount of rotation gaps which shifted to Step 1001 and was detected by the amount detection means 7g of the 2nd rotation gaps, and the form of the new standard of said standard re-setting means part 7e. The erect-image record of each nominal contour or the same form can be carried out because the memory control 10 is controlled by the output which is the 2nd coordinate correction means 7h and records by this each frame image recorded on field memory FM6 on the image memory 11.

0088the following new nominal contour -- said new nominal contour -- the same -- a camera -- a bread -- or, By movement of tilting directions, since it may disappear from a screen, it operates like the above-mentioned, the form of a still newer standard is set up, the angle-of-rotation difference of the setting-out form and the form of said new standard is calculated and detected by said same processing, and it is set as the still newer degree of reference angle.

0089Even if one new nominal contour after another can be set up in the camera move direction and a picture changes continuously with camera movement by repeating such operation, Since a new nominal contour is set up based on the nominal contour of the erect image set up first and the first erect image and the erect image of the direction can always be set to it, a camera moves, and even if it rotates, since an erect image is always obtained,

as for a photography person or an observer, a legible picture is acquired.

0090As mentioned above, although the embodiment which sets up a new normal coordinate and carries out tailing and spin compensation in the case where it separates from the area which the photographic subject is observing etc., by the standard re-setting means 7e, the 2nd tailing means 7f, the amount detection means 7g of the 2nd rotation gaps, and the 2nd coordinate correction means 7h was described. Of course, only this form is not the method of the management for an area blank. If it detects that the form where the area currently observed was extracted separates as the example using the function of the standard re-setting means 7e, As explained, the suitable photographic subject in an area is chosen as the point, the label A is again attached to the extraction form of the selected photographic subject like the operation which set up the normal coordinate by the 1st standard setting means 7a, and it records on RAM2.

0091Thus, if selected extraction form is again made into a normal coordinate, operation of the spin compensation of a picture, etc. will be attained by continuing after that the operation explained by a 1st embodiment, and the completely same operation. Thus, supposing it calls the again selected photographic subject the means made into a normal coordinate, and a normal coordinate resetting means, the operation same only by adding this means to the embodiment of drawing 1 as the embodiment shown by drawing 4 and drawing 6 will be attained.

0092Next, operation of the figure is explained in detail using drawing 5. Drawing 5 a is an extracted image on the basis of the big tree 31, and detects the center of gravity G1, the longest point T1, and the angle R1 by said 2nd direction detecting means. Next, if a camera moves rightward, a picture will be acquired like drawing 5 b. Form is judged by the 2nd tailing means 7f, and the big tree 31 of the picture detects the new center of gravity G2, the longest point T2, and the angle R2 for it by the 2nd direction detecting means, and calculates amount of rotation gaps R1-R2 with front drawing 5 a by the amount detection means 7g of the 2nd rotation gaps. Based on this calculated value, centering on the center of gravity G2 of the big tree 31 of a broken line frame, image rotation of the angle is carried out so that it may be set to R1, spin compensation of the picture is carried out to the angle of the first big tree 31, and an erect image is obtained like drawing 5 d by the 2nd coordinate correction means 7h.

0093In said drawing 5 b, since the coordinates of the big tree 31 are near the end on a screen, Ogi 33 of the form of the same color of the counter direction is extracted, it is set as a new nominal contour, and center-of-gravity G3, longest point T3, and the angle R3 are calculated simultaneously. It asks for angular difference R3-(R1-R2) of the value, and amount of rotation gaps R1-R2 with front drawing 5 a and the angle R3 of Ogi 33, and the angle equivalent to the angle R1 of the first erect image is obtained. This becomes the degree of reference angle of a new nominal contour.

0094Next, when a camera moves to drawing 5 c, Ogi 33, By angular difference R4-R3- (R1-R2) with reference angle degree R3- (R1-R2) of the new nominal contour which became the center of gravity G4, the longest point T4, and the angle R4, and was set to this value in Ogi 33 of said drawing 5 b. The amount of rotation gaps with the first nominal contour can be detected, and the coordinates recorded value of the output form of drawing 5 c is changed into said the appearance. Eventually, erect-image record is carried out like drawing 5 e, and the figure is displayed. Here, the address of the image memory 11 sets up each address (equivalent to each frame) to which the Still Picture Sub-Division record of the camera was corrected from the general address value of the whole memory at the time of an end correspond to said coordinates recorded value and the couple 1.

0095In the case of big form which requires the extraction form of a middle-of-the-screen part to the end of a screen, in the above form extraction, Since the end of a screen or the coordinates of the specific region are known beforehand, a program is changed by detecting this, extracting the form of another color and redoing setting out within extraction form, so that the form which is not applied to the end of a screen or the form outside a specific region may be obtained.

0096In the color setting of picture information, the color information of an extracted image may be detected beforehand as mentioned above, and color detecting operation may be performed by the method of color specification using the detected information. Although angle of rotation of the above form is described from the angular difference of the direction of the longest point from the center of gravity of the tailing form of the same form as a nominal contour, or the shortest point, it is not what is limited to this -- the first volume of the former and "an Image Processing Division industrial application conspectus", date-of-issue January 17, 1994, and publishing office; FUJI techno cis- -- it may realize using the circle element method and straight-line element method which are indicated to 409 Page.

0097A circle element method pays its attention to the local feature like a hole in circular form here, A circular line is generated so that it may pass along the local feature like a hole centering on the center of gravity of reference circle form and a tailing circle configuration, From the angle of reference circle-shaped partial ****, the change point of a total of two points of partial **** of a tailing circle configuration, and the center of gravity, are the amount of rotation gaps the method of calculating, and a straight-line element method, In the nominal contour which consists of straight lines, it asks for inclination of each line segment of a nominal contour and tailing form, and the intersection of the same line segment is made into the starting point, and although it is the method of making inclination the amount of rotation gaps, it omits for details.

0098Next, 3rd one embodiment is described below using drawing 6. In the figure, the same number shows the

thing of above-mentioned drawing 1 - drawing 5, and the function, and it omits explanation.

0099In drawing 6, 7i is a tailing form displaying means, 7j is a calculating means, the amount of rotation gaps of display angle of rotation by directions of key 14 operation or angle of rotation obtained from the gravity sensor, and the above-mentioned nominal contour is calculated, and the direction of an image of a display is controlled.

0100Although a gravity sensor is not illustrated, it cannot be overemphasized that it may be the same as that of what was described in the conventional example (Japanese Patent Application No. 8-319069).

01017k is the direction compensation means of the spin compensation image **calculating means / 7j / coordinates / on a screen** centering on the center of gravity of a nominal contour.

0102Next, operation is described. Before rotating the display surface of a display device, an erect image is specified, the form is extracted, and it is made into a nominal contour at said the appearance. Then, when only a photography person's direction of a display surface is rotated right 90 degrees, for example, it detects with a photography person's key 14 operation or the output of a display device and said gravity sensor of one, and rotation directions are performed right 90 degrees.

0103In this case, a photography person's key 14 operation or a gravity sensor is used as a direction setting-out means of an image to set up the new direction of an image.

0104The signal detected in this way is inputted into one side of the calculating means 7j of RISC-CPU7. The above mentioned erect image is made into the form of a standard, and the amount of rotation gaps of the same form is detected and inputted into another side of the calculating means 7j. With the amount of rotation gaps which calculated both inputs, rotation of the tailing form where it changed to the rotational display simultaneously with change right 90 degrees by the direction compensation means 7k of an image more delicately than a nominal contour is corrected, and an erect image is displayed on real time by the electrochromatic display displaying means 16. Thereby, even if a photography person rotates a display surface, he can always get an erect image. Since it is corrected to the picture which rotated the display surface 90 degrees by the direction compensation means 7k of an image by the image memory 11, a picture is recorded on it with the value. Since it changes by the direction of the display surface at the time of reproduction even if it records on the image memory 11 by this display surface returned 90 degrees on the contrary, which direction may be sufficient. It does not limit.

0105In extracting the form of said standard after rotation of the display surface of a display device, with a photography person's key 14 operation or a gravity sensor, a rotation indication signal is inputted into one side of the calculating means 7j right 90 degrees, for example, an image is rotated right 90 degrees, and it indicates by erection at a photography person. Then, the form of the standard of the erect image in a display is extracted, and the same treatment as the above-mentioned detects the amount of rotation gaps from a nominal contour. This is inputted into another side of the calculating means 7j of RISC-CPU7.

0106Since the input value of the calculating means 7j is the same before rotating the above-mentioned display surface, said same processing can always obtain an erect image, even if **** and a photography person rotate a display surface.

0107As stated above, even if it sets up a nominal contour before and after directions of display surface rotation, an erect-image display is always obtained.

0108As an example of RISC-CPU7 which performs the above image rotation processing, what processes a pixel in 93 ns (4-bit pixel) /with 14 angle of rotation can be considered.

0109For example, in order for 14 angle of rotation to amend at 8 bits in 250,000 pixels /, according to the data of a monthly "electronic industry material" given in 128 page - 133 pages of the April, 1992 items, 46 or 5 ms of abbreviation starts. Therefore, although it is not enough with this one for the frame period of TV, the real time processing which was enough for the frame period of TV is attained by processing in parallel, using this two or more.

0110Although an interleave scan has described a video signal from an imaging device, it may not limit to this and a non interleave scan may be sufficient. In this case, since what is necessary is just to perform a count of a lengthwise direction address of a screen in order, it cannot be overemphasized that composition becomes easy.

0111As mentioned above, although an embodiment has been described paying attention to pressing down rotation of a photographic subject currently observed on a screen as much as possible, in taking a photograph, it cannot be overemphasized that it does not restrict to this form.

0112For example, for a certain reason, what carries out various motions depending on a photographic subject may be unknown in whether the camera itself which photos whether a photographic subject rotated rotated. Therefore, correction effects of a certain amount of hand of cut are given, and it may constitute so that an effect of amendment may be made to fade with the passage of time. Hereafter, an embodiment which met this specification is described using a block block diagram of drawing 13.

0113In the figure, the same number shows a thing of drawing 1 mentioned above - drawing 3 and drawing 7 - drawing 9, and the function, and it omits explanation.

01147L is a resetting means of a normal coordinate mentioned above, when extraction form moves out of specific area, resets a normal coordinate to another photographic subject, and continues tailing. If **fixed** there is change of the amount of rotation gaps which 7 m is a correction amount adjustment device, and was detected by the

amount detection means 7c of the 1st rotation gaps at all, when large, Fault amendment is prevented by limiting a correction amount in the 1st coordinate correction means 7d to below fixed, By performing a re set of the 1st standard setting means 7a, when movement magnitude of extraction form detected by the resetting means 7L of a normal coordinate separates from a fixed quantity from a center, By repeating a re set in high frequency further from frequency of a re set which the resetting means 7a of a normal coordinate mentioned above was originally controlling, it constitutes so that it may be possible to oppress a blur of a hand of cut of a photographic subject of middle of the screen mostly.

0115Of course, not only middle of the screen but a specific area may be provided, and a start of a re set may be detected, Or it cannot be overemphasized that in the case of a photographic subject which reduced a correction amount of the rotational amount of gaps as specific area was approached, and separated from a center it may constitute so that it may be made to amend rotation weakness.

0116

Effect of the InventionAs mentioned above, according to this invention, the erect image in an image pick is specified in early stages, Extract the form of the color set in real time, and take operation measures and the amount of rotation gaps from the form where the extraction form was set up first is detected, Since it always indicates by an erect image even if a picture rotates at a high speed, since the image which carried out the rotation gap is amended in real time and displayed in the form direction of said erect image set up in early stages, a picture is made legible and there are visual fatigue and an effect of preventing dizziness.

0117Since it amends so that the angle of the form on the basis of the form of the erect image set up in early stages may be maintained, and it displays, Since only a background screen rotates and the front direction of a nominal contour always does not change even when the same form that the erect image made into the standard followed rotates continuously, it is effective in the ability to always supervise and observe a nominal contour with an erect image.

0118Since it always indicates by an erect image even if only the display direction of a display changes, since the direction of an erect image is amended according to the change of the direction of a display surface of a display, there is a user-friendly effect legible.

0119Since rotation of the form of the new standard acquired from the form of the standard of the first erect image by a taken image moving can be set up in the direction of the first erect image, it is effective in the ability of a photographing area to perform the regular erect-image display of image rotation broadly.

0120Since the same processing as the above of a series of inputted images, such as VTR and a video camera, can be performed, it is effective in the ability to perform the regular erect-image display of image rotation.

Field of the InventionThis invention relates to signal processing, such as taken images, such as an electronic "still" camera or a video camera, or a series of recorded images, detects change of direction of the specific object image in a screen, and relates to the image display device which amends the hand of cut of a display image and is used as an erect image.

Description of the Prior ArtAs an example of the image display device which can change the display direction of the conventional picture, setting up an image display direction by an operator's key operation is shown in JP,H5-35364,A.

0003In JP,H7-168529,A, two or more photo sensors are arranged to the periphery of an image display device, an operator's position over said display device is detected, and control of the image display direction is performed so that the display of the display device always seen from the operator may be an erect image.

Effect of the InventionAs mentioned above, according to this invention, the erect image in an image pick is specified in early stages, Extract the form of the color set in real time, and take operation measures and the amount of rotation gaps from the form where the extraction form was set up first is detected, Since it always indicates by an erect image even if a picture rotates at a high speed, since the image which carried out the rotation gap is amended in real time and displayed in the form direction of said erect image set up in early stages, a picture is made legible and there are visual fatigue and an effect of preventing dizziness.

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Problem to be solved by the inventionHowever, although the image display device of the above conventional technologies detects the direction which should correct a display by the key operation by an operator, movement to a photo sensor, etc. and the direction of image display is set up according to the detected direction, that case where a high speed response is difficult exists constitutionally. The gravity sensor for gravity direction detection is formed in the display device of a portable information-and-telecommunications machine, and these people propose the image display device which controls an image display direction by the output of the gravity sensor as JP,8-319069,A is shown.

0005As an example of this gravity sensor, it is less than inner capacity of a container, seal a conductive liquid hermetically in a container, and stabilized character where that conductive liquid moves in the gravity direction is used. There is composition which detects conduction by contact with an electrode which were beforehand provided in the circumference in a container, and which faces, and a conductive liquid located in the stable place, and non-contact, and non-conduction, and detects angle of rotation. In order to amend a hand of cut centering on an optic axis of this camera, when angular velocity of rotation of a picture makes it correspond to about 1 rotation / 1 second, i.e., frequency, if it is about 1 Hz or less, can follow in a display device using a gravity sensor, but. There is a fault beyond it it becomes difficult to answer if high-speed on structure of a sensor.

0006In recent years, in a video camera, an electronic "still" camera, etc., a camera part and a display are separated and a camera of composition of having connected them with an exclusive cable is put on the market.

0007These place a display at hand, and a camera part is moved to a free position, and the photography person can take a photograph from a legible direction.

0008However, in such composition, movability of a camera part is good, and since it can be freely rotated by it also to an optic axis of a lens, it tends to rotate a taken image. Therefore, he takes a photograph, performing operation which is corrected in the direction of an image of the original erection, even if a camera operator takes a photograph so that a camera may not be rotated as much as possible, or he rotates, looking at a display of a picture. However, since the camera operator cannot see for example, when a camera operator and those who observe a display are another, control of an angle of image rotation is difficult and a size and its speed of an angle to rotate are easily changed to unspecified.

0009Therefore, when the gravity sensor mentioned above amends, depending on camera operation, the speed of rotation of a camera may rise easily, and the high-speed field which cannot be amended may occur for a gravity sensor. For this reason, follow operation becomes poor, rotation of a picture arises, and it will be hard coming to see. When it gazes at the image to rotate and follows, falling into the situations, like a temper worsens is also considered.

0010This invention is solved and such a conventional fault to the observer of a display screen on a screen, Make the direction of the form of an image where the specific color specified as a standard stood erect into the standard of the direction which fixes rotation, and the amount of rotation gaps of the direction in the form which followed extracting the form specified as this standard is detected, Spin compensation of the coordinates of the screen is carried out, and it aims at providing the composition which realizes the display of the image which stood erect continuously to the display screen.

Means for solving problemAs for this invention, an erect image sets the position of an imaging device as a display screen in photographing to achieve the above objects that it will be obtained. next, the observer of a display screen -- the same period as observation -- or, It has a form extraction means to extract the binary-ized form of the erect image which the observer specified in real time, by specifying the color of an erect image before it, distinguishing the luminosity corresponding to the color of this specified erect image, and extracting the pixel of the color corresponding on the imaging screen, and luminosity. The standard setting means which specifies the features, such as coordinates of the form on the screen obtained by this extraction, a position of the center of gravity, and a direction, as a standard for following, and sets them up, the specific point from the center of gravity of a tailing means to follow in real time extracting the form of this set-up standard, the form of said set-up standard, and the same form produced by following it -- or, An amount detection means of rotation gaps to

calculate the difference of angle of rotation with the same form produced by following with the form of said standard by the direction of a specific straight part, and to detect the amount of rotation gaps of a picture, The compensation means which performs spin compensation of the picture in a pixel unit in the form direction of said standard with this detected amount of rotation gaps, and a means to display record or a correction picture for the outputted image from a compensation means, and to always give an observer an erect-image display constitute invention.

0012The case where the same form produced by following a nominal contour moves to the specific region on a screen in order to correspond to panning etc. widely, When predetermined movement magnitude is detected, the form used as another new standard is extracted in the camera move direction, The re-setting means of the standard which repeats the operation which sets up on the basis of the features, such as coordinates of the form on the screen obtained by that extraction, a position of the center of gravity, and a direction, and sets up this new standard, The 2nd amount detection means of rotation gaps that detects the amount of rotation gaps from the 2nd tailing means that follows extracting the form of said standard, the form of a still newer standard, etc., the same form produced by following, and the form of the standard at the time of being set up, and the 2nd compensation means that performs spin compensation of a picture based on said amount of rotation gaps. A means to display record or a picture for it and to always give an observer an erect-image display constitutes invention.

0013This invention is applicable not only in the image input from the camera which the photography equipment holds. Then, even if the target pictures are a series of outputted images recorded on recorded image equipment from an electronic "still" camera, an ultrasonic scanner, an X ray camera, etc., The input output means which inputs these and is outputted after that is established, and the picture through this as well as **** is processed, and is made the composition which always displays an erect image on an observer.

0014Apart from rotation of the picture by rotation of an imaging device, it also assumes that a display device and an observer's position change, and it is amended. therefore, the case where the display surface of a display device rotates 90 degrees individually -- the rotation -- hand control -- or, The rotation directing means which is detected automatically and directed is established, the amount of rotation gaps of the picture processed like **** next and the rotation of said rotation directing means are inputted, and it has composition which has a calculating means which outputs the operation output amended by said compensation means so that an erect-image display may always be performed to an observer.

0015

Mode for carrying out the inventionA 1st embodiment of the image display device of this invention is described below. Drawing 1 is a block block diagram showing a 1st embodiment.

0016In the figure, the optical system section which leads the light in which 1 let the lens pass to an image sensor, and 2 are image sensors which change a lightwave signal into an electrical signal, and are taken as CCD here. CDS in which 3 reduces the noise of an image sensor, A/D from which four change an analog signal into a digital signal, The camera signal processing part which 5 divides digital image data into a color and luminosity, and is processed, Frame memory FM which 6 comprises RAM (Random Access Memory) and records a frame image, RISC-CPU which 7 performs operation of each part, and control and transmission and reception of data, and performs programing operation at high speed, The 1st standard setting means which 7a specifies the form extracted first as a normal coordinate, and is set up, 7b judges the form set as the normal coordinate, and the form of the same area on a screen, A 1st tailing means to follow the form of a standard, and 7c build in the 1st direction detecting means etc. that detect the direction of the direction of the center of gravity of the coordinate value of the nominal contour of the 1st standard setting means 7a to a specific point, and the center of gravity of the coordinate value of the output form of the 1st tailing means 7b to a specific point, An amount detection means of the 1st rotation gaps to calculate the amount of rotation gaps of the tailing form to a nominal contour from the detecting direction, a 1st coordinate correction means to perform 7 d of coordinate correction of the output form of the 1st tailing means 7b from the amount of rotation gaps of the amount detection means 7c of the 1st rotation gaps, a form extraction means by which 8 extracts the luminosity of a color set and its color set, and the picture, by which 10 was processed -- the writing to an image memory -- or, It constitutes from an electrochromatic display displaying means which the memory control which controls read-out etc., the image memory which records the picture which carried out coordinate correction of 11, the key as which 14 expressed various kinds of operator guidance keys to one, and 15 make a remote control receiver and to which 16 carries out the color image display of the video signal.

0017Next, operation is explained. The light figure from the optical system section 1 is received by CCD2, and it is changed into an electrical signal. The signal outputs the signal to which the noise decreased by CDS3, inputs it into A/D4, and an analog video signal is changed into the digital video signal S0. The transform signal S0 is inputted into the camera signal processing part 5, and a compensation process is carried out by the control signal S1 from RISC-CPU7, and it outputs the digital video signal S5 delayed for digital video signal S4 and its data S4 of the data 1H. RISC-CPU7 inputs the indication signal of the key 14 or the remote control receiver 15 which receives the signal of an unillustrated remote control, and it performs directions of operation to each part. The

reference clock signal with which the output signal S3 of the camera signal processing part 5 sets up the operation timing from said image sensor CCD2 to A/D4. The output signal S2 is a signal which controls said optical system section 1.

0018Next, the form of the erect image in a photography screen is extracted, and the operation which specifies the form which serves as a standard out of the extraction form is described. Said image sensor 2 is fixed to the position (position which is visible to erection) from which an erect image is obtained, and one output digital video signal S4 of said camera signal processing part 5 is inputted into the form extraction means 8. Form is extracted by distinguishing and binary-izing the level of the luminance signal of the color by the color specification from RISC-CPU7. The form extracted by this is the data constellation corresponding to the position of the pixel on the photography screen which has the specified color by which 1 and 0 were binary-ized. The binary-ized data is inputted into RISC-CPU7.

0019As an example of how to specify a color, the key which is equivalent to each color in the key 14, for example may be chosen, and the color of form to specify may be inputted, Or using the composition of color extraction of a form extraction means 8 to explain in details later, the simultaneous comparison of 12 colors - the 126 colors is carried out for the color of only a middle-of-the-screen part in parallel, and it may be made to make the color of the decided result into a color set automatically.

0020The flow chart of the typical figure of drawing 3 a and drawing 7 - drawing 9, etc. explain operation of RISC-CPU7 below. If said binary-ized data is inputted into the 1st standard setting means 7a, in the 1st standard setting means 7a, all the positions of the extraction form of a color set will be recorded as coordinates on a screen, and operation specified on the basis of one form of them will be performed. Since there is the necessity that Step 801 of drawing 7 performs first setting-operation of the form which becomes a standard, the frame flag P which shows the directions is set to 1. Next, it shifts to Step 802 and the coordinates on the screen of an extraction-shaped perpendicular direction are set up.

0021In drawing 3 a, an address of a lengthwise direction to the bottom is obtained from on on a screen.

0022In order to set up this address, a Vertical Synchronizing signal and a Horizontal Synchronizing signal which are outputted continuously are used. Usually, when obtaining a video signal picturized with an interleave scanning mode, a Vertical Synchronizing signal and a Horizontal Synchronizing signal of a circuit also support an interleave scan. Then, using this, it supposes that trailing edge edge (it is the same as that of a rising edge and the following when it is considered as a driving signal of negative polarity) of a Vertical Synchronizing signal, and front tip edge (falling edge) of a Horizontal Synchronizing signal are in agreement, and an odd number field explains hereafter.

0023V counter is started from trailing edge edge of a Vertical Synchronizing signal, a count is started with trailing edge edge (rising edge) of the Horizontal Synchronizing signal, it counts with both-edges edge of a Horizontal Synchronizing signal after that, and a count is stopped with front tip edge of the following Vertical Synchronizing signal. It aims for this to complete all the extracting processings with one frame. It is for making it make each horizontal line and each counter value which the interleave scan was carried out and have been arranged correspond, when odd number is obtained in an odd number field, a counter value of even perpendicular directions is acquired in an even number field and one frame is completed.

0024Since horizontal binary-ized form is outputted by this operation after the trailing edge edge of a Horizontal Synchronizing signal counts (odd number), if counted value when extraction form is detected is memorized, the position of an extraction-shaped perpendicular direction will become clear.

0025In drawing 3 a, the transverse direction from the left of a figure to the right is assumed as horizontal.

0026Next, in an even number field, since the trailing edge edge of a Vertical Synchronizing signal and the front tip edge of a Horizontal Synchronizing signal are not in agreement, V counter is started from the trailing edge edge of a Vertical Synchronizing signal, a count is started with the front tip edge of a Horizontal Synchronizing signal, it counts with the both-edges edge of a Horizontal Synchronizing signal after that, and the value of even counters is generated by stopping a count with the front tip edge of the following Vertical Synchronizing signal. Since horizontal binary-ized form is obtained after the trailing edge edge of a Horizontal Synchronizing signal counts (even number), the position of an extraction-shaped perpendicular direction becomes clear by memorizing the counted value at that time.

0027The address which the address which counted the coordinates on the screen of the above perpendicular direction of the frame image of No. odd to the oddth was obtained, and counted the coordinates on the perpendicular direction screen of a frame image of No. even to the eventh is obtained, and processing of record of the coordinates of the perpendicular direction on the screen by which the interleave scan was carried out is performed.

0028In Step 804, in order to obtain the address of the transverse direction from the left of the drawing 3 a screen to the right, H counter is started from the trailing edge edge of the Horizontal Synchronizing signal of the video signal of said form, the clock corresponding to the picture element on a screen is counted, the standup of said binary-ized data and the counter value of a falling edge are recorded, and it is made the horizontal coordinate value on a screen. Reset of this H counter is performed with the front tip edge of the following Horizontal Synchronizing signal.

0029In Step 805, the coordinate value of the binary-ized form which made the lot the value of H counter which packed and extracted the coordinate value of the form extracted from Step 802 having applied to Step 804, and the value of V counter at that time is recorded on RAM1 (not shown) of RISC-CPU7. That is, the value of the direction of V of the horizontal line which has form as data of a binary-ized-shaped field, and the value of the direction of H of the both ends on a horizontal line with form are recorded.

0030As mentioned above, the video signal of an interleave scan, Since one frame is the 2 fields, and counted V counter value of perpendicular direction coordinates to the oddth in the odd-numbered field and counted it to the eventh in the even-numbered field, By rearranging V counter value from both the fields in order, the table of the value of the data constellation of the coordinate value of the extraction form shown with the value of the perpendicular direction in the picture of one frame and the horizontal value from said H counter value, i.e., extraction-shaped coordinates, is obtained on RAM1.

0031By the following step 806, the form extracted on the screen distinguishes that it is the form which has 1 lump's field. For this reason, it distinguishes by whether the field on the horizontal line detected as binary-ized data between the horizontal lines of the adjoining upper and lower sides on a screen based on specification of a color has touched mutually.

0032Now, the horizontal line in the midst of processing is made into the present line now, the horizontal line in front of one will be called a preceding line from this, and it explains still in detail hereafter.

0033First, when the extraction region on the horizontal line shown with the value of the both ends of the extraction form which recorded the point on the present line is in contact with either of the extraction regions on the horizontal line shown with the value of the both ends of the extraction form which recorded the point on a preceding line, it judges with 1 lump's field.

0034When the value of the both ends of the extraction region of the present line is contained for one of the two or both to the both ends of which field of the extraction region of a preceding line as for the judgment of whether to have touched, Or if the case where the value of the both ends of which field of the extraction region of a preceding line is contained between the values of the both ends of the extraction region of the present line is detected, it can judge easily.

0035When it judges with there being a field which has touched after judging in this way, it judges with a part of identical shape, and the same label as the field of a preceding line is attached by the following step 807, and when shift and there is nothing to Step 808, it shifts to Step 808, without doing anything.

0036Although an extraction region is located on the present line, when there is no extraction region in a preceding line, after attaching a new label, it shifts to Step 808.

0037It returns to said step 802, the same operation is continued again, and the coordinates recording processing of total extraction form is ended until it detects the end of one frame. Pretreatment judges the frame counter $P = 1$ of detection directions of a nominal contour by the following step 809. The label A is attached and recorded, in order to be set to YES, to shift to the following 810 and to show a normal coordinate for the coordinate value of the form near the middle of the screen of a directions color part in RAM2 (not shown) of RISC-CPU7, since $P = 1$ is set up first. Since the setting-out completion flag of the normal coordinate was set as the normal coordinate $F = 1$ and setting out of the nominal contour was completed, it changes into the frame counter $P = 2$ from said frame counter $P = 1$.

0038Here, although a coordinate value for form detection of a portion of a color set is set up near middle of the screen, it may not limit to this and another portion, for example, form from a right end of a screen, may be sufficient. Although mentioned later for details, to set up a specific field and perform special processing there, it is necessary to avoid that place but, and if it becomes except that specific field when it is this processing, it is good anywhere on a screen.

0039Next, although it shifts to the 1st tailing means 7b shown at Step 902 of drawing 8, Since said processing is the processing which specifies form of a standard and was set as the normal coordinate $F = 1$, a judgment of being the normal coordinate $F = 1$ of Step 901 is set to YES, and shifts to Step 904 of the 1st following direction detecting means, without performing tailing processing.

0040In processing of this step 904, a coordinate value of the center of gravity of a nominal contour which recorded coordinates previously is calculated by calculation, and a coordinate value of the longest point from the center of gravity or the shortest point is calculated and calculated. In order to calculate a coordinate value of the center of gravity, coordinates of level and a perpendicular direction of a field where extracted form exists, for example are integrated over the full screen, and it asks by dividing by a pixel number of the existing field. Centering on the center of gravity, an angle with specific points, such as the shortest point or the longest point, is calculated from the horizon, and the result is recorded on said RAM2 as a degree of reference angle which performs an erect-image display.

0041Since it becomes the processing instruction of tailing form from a magnetic field, in order to show the directions, it is set as the normal coordinate $F = 0$.

0042In the above explanation, since the computation from centroid calculation to angle calculation is the simple computation based on the coordinate value of each pixel, it can be performed in a short time. What is necessary is

to judge the next picture and just to set up processing change a normal coordinate into form with the longest point or the shortest point, when extraction form has a round shape, an object form, etc. and can calculate neither the longest point nor the shortest point.

0043Since the above processing is processing which specifies form, processing of the frame image before the frame image which is performing the present processing is omitted. Therefore, at Step 905 of the amount detection means 7c of the 1st rotation gaps, it becomes zero, and passes, without processing in Step 1001 of the 1st coordinate correction means 7d of following drawing 9, and the amount of rotation gaps shifts to the processing which records an extracted image on the image memory 11.

0044Here, the detailed circuitry of said form extraction means 8 is explained below using drawing 2. The standardizing part in which 21 standardizes the degree of saturation of a color, and 22 and 23 are directions of the color from RISC-CPU7 grade, and it is the extraction part A which judges the level of the luminosity which has an ingredient of a color according to directions of the color, and performs binary-ization, and the extraction part B. 24 and 25 are the logical addition parts A which carry out OR operation and the logical addition parts B of a digital signal. 26 and 27 consist of filter part A which outputs a 1-pixel digital signal by the majority decision of 3*3-pixel digital binary-ized data, and filter part B.

0045Next, operation is explained. The luminosity of digital video signal S4 and a chrominance signal are inputted into the standardizing part 21, and standardize the degree of saturation of a color. If the standardization signal is simultaneously inputted into the extraction part A22 and the extraction part B23, the binary signal based on the specified color will be outputted by distinguishing and binary-izing the level of the luminosity which has a color specified from RISC-CPU7.

0046For example, if four colors are specified simultaneously, the binary signal of four specified colors will be outputted from the extraction part A22 and the extraction part B23. The binary signal compounded based on four specified colors is obtained, respectively by inputting and carrying out the logical sum of these four binary-signal outputs to the logical addition part A24 and the logical addition part B25. The output is inputted into the filter part A26 and the filter part B27, and a noise is removed and it inputs into said RISC-CPU7. Thus, the binarization processing of form which carried out color specification can carry out to real time by easy hard circuitry.

0047On the other hand, the output digital video signal S5 (you made it delayed 1H here for delay doubling of signal processing) of said camera signal processing part 5 is inputted into frame memory FM6 via the memory control 10, and the picture information for one frame is stored temporarily.

0048As mentioned above, since a frame image **beginning**, here the extracted image inputted into RISC-CPU7 in the time of setting up a normal coordinate, It memorizes then and the image memory 11 of the memory address which is equivalent to the coordinates on the screen of said extracted image in the picture of frame memory FM6 by the memory control 10 memorizes.

0049the access path of frame memory FM6 or the image memory 11 -- that is, Courses, such as writing of the data transmission-and-reception timing to a memory or the memory, read-out directions, and a call of a memory address, are explained as what overlaps with the course of the digital video signal S6 or the digital video signal S7.

0050Next, if a frame image is newly obtained from said camera signal processing part 5 by the digital video signal S5, the image data before **one** recording on frame memory FM6 will be replaced with the frame image data which might be new.

0051In order to double the delay produced when performing signal processing, such as extracting processing, to the digital video signal S5 which is a new frame image from said camera signal processing part 5, suppose that digital video signal S4 will input only 1H into the form extraction means 8 early here, but. The form binary-ized based on the color specified based on this digital video signal S4 as the point is extracted, and this data is inputted into the 1st standard setting means 7a of RISC-CPU7.

0052Although the coordinates on the screen of the form set as the standard change with camera movement, recording processing of all the coordinate values of the extracted binary-ized form is performed like the above-mentioned for every frame, and the result is recorded on RAM1 of RISC-CPU7.

0053Now, next, when it has returned to processing of drawing 8, since it is set as F= 0 at Step 904 to have described above, the judgment of the normal coordinate F= 1 in Step 901 shifts to the 1st talling means 7b which is set to NO and shown at Step 902. Then, out of RAM1, the form of an area equivalent to the shaped surface product set as the standard of said RAM2 label A is searched, the form produced by searching is judged to be the same form as a nominal contour, and this is recorded on RAM3.

0054When there is two or more form of an equivalent area at this time, as a simple discriminating means, The form of the position nearest to the position in which the thing nearest to origin could be chosen as, and the last extraction form existed the maximum of the size of horizontal and a perpendicular direction may be chosen, and what may be judged with pattern matching still more nearly eventually is omitted for details, although it is needless to say.

0055Now, the coordinate value of the point of the shortest or longest distance is obtained from the center of gravity calculated from the coordinate value of the present frame picture by Step 903 which shows operation of

the 1st following direction detecting means, and its center of gravity, and the angle centering on the center of gravity is calculated, and it is recorded on said RAM3. Since it becomes the directions which make tailing form process next time also, it is set as the normal coordinate $F=0$ for the directions.

0056Next, in Step 905 which shows operation of the amount detection means 7c of the 1st rotation gaps. the center of gravity of said RAM3 to a preceding frame image, and the shortest point -- or, Since the longest point is acquired, the value of the quantity in which the picture carried out parallel translation is obtained from the difference of the coordinate value of the center of gravity of each form stored by RAM2 and RAM3 based on the center of gravity, the shortest point, or the longest point of a nominal contour of the label A. **of Step 904 of RAM2** The direction of the shortest point or the longest point, i.e., the value of an angle, is acquired from the center of gravity of the coordinate value of the shortest point from the center of gravity of RAM2 and RAM3, or the longest point, and the coordinate value of the center of gravity to each form. The difference of the frame of the form of a standard and the angle between the extraction form of a present frame picture, i.e., angle of rotation, is acquired, and this becomes the amount of rotation gaps from these.

0057Thus, based on the value calculated with the coordinates on a screen, the amount of rotation gaps of the present frame picture of identical shape can calculate in a short time.

0058Here, a part of form becomes a shadow gradually, and when missing, tailing becomes impossible **the form which has followed noting that it is the same form as the form set as the standard moves, and** . In that case, it cannot be overemphasized that what is necessary is just to have operation permitted even if the form set as a standard is updated with 2 - 3 frame interval, and the difference in form which changed gradually is decreased and there is quantity of a difference a little, and composition.

0059Next, by the 1st coordinate correction means 7d which shows operation at Step 1001 of drawing 9, the amount of rotation gaps from the center of gravity is calculated, and the coordinates recorded value of the extraction form of a present frame picture is changed. Thereby, via the memory control 10, the coordinates of only the part of the amount of rotation gaps are corrected centering on the center of gravity of a nominal contour, and it is recorded on the image memory 11 within a vertical-retrace-line period. It may deal with 1 pixel of rotation of a picture at a time as an example, and it may perform it centering on the center of gravity of RAM3.

0060Thus, the amount of rotation gaps is detected and amendment returned to an erect-image picture is performed by processing which changes a coordinates recorded value with the value.

0061The above processing is performing operation holding direction of a picture first set as a standard, and when an output of the following frame image or subsequent ones continues these operations, rotation of a specific photographic subject on a screen can be oppressed, and a picture which always turns into an erect image can be displayed on continuation, and can be recorded.

0062When it does not exist on a screen which an address which it is going to change and amend recorded at this time, it cannot be overemphasized that what is necessary is just to amend by interpolating based on image data of a present frame picture, but it omits for details.

0063Thus, even if a camera rotates freely in a picture in which a nominal contour of a set-up erect image exists, data of the image memory 11 in which video of an erect image was always obtained is recorded, and it displays by the electrochromatic display displaying means 16.

0064Although a hand of cut of form set as a standard was always amended by the above explanation and rotation is prevented, Of course, by preventing rotation to rapid rotation, easing amendment to a rotation more than fixed, and performing operation of changing the angle of a standard of amendment itself, by amending gently and adjusting a correction amount, It cannot be overemphasized that it becomes possible to control prevention from rotation with nature more.

0065Next, operation of drawing 1 is typically explained using drawing 3. Drawing 3 shows a picture from a camera and drawing 3 a - drawing 3 d show a case where a camera rotates.

0066The first drawing 3 a shows the image pick of a camera, and shows the case where the trees on a picture are judged as an erect image. On a screen, two green and brown colors are extracted simultaneously, and the luminosity edge which the big tree 31 and Ogi 32 binary-ized like drawing 3 b is extracted. In the figure, the 1st direction detecting means 7c detects the coordinates of the edge part of the extracted picture, and the center of gravity G1 is calculated like drawing 3 c. The longest point M1 is calculated from the center of gravity G1. In this example, the point which is most distant from the center of gravity from the ease of the explanation at the time of using a figure is set up as a reference point for detecting a direction.

0067Based on a reference point of this extraction form, the angle K1 with the horizon passing through a line segment and the center of gravity G1 from the center of gravity G1 to the longest point M1 is calculated by the amount detection means 7c of the 1st rotation gaps. Next, a camera moves, and if it is on a monitor separated from a camera and a picture in the state where it rotated is observed, suppose that it came to be shown in drawing 3 d.

0068In this figure, although the big tree 31 is shown on Drawings as an erect image, This is erected, shows and assumes that a portion within the limit shown with an alternate long and short dash line as a taken image is photoed noting that a photographic subject does not move on the assumption that processing from the 1st

standard setting means 7a to the amount detection means 7c of the 1st rotation gaps carries out, but a camera moves.

0069In this photoed screen, although a picture in the state where form of two trees inclined aslant is acquired, the angle K2 with the horizon passing through a line segment and the center of gravity G2 from the center of gravity G2 to the longest point M2 is obtained based on this picture.

0070Next, by the 1st coordinate correction means 7d, a recorded value of coordinates on a screen is changed and it is recorded on the image memory 11 so that it may be in agreement in the direction of **from the center of gravity G1 of front drawing 3 c to the longest point M1 in the direction of from the center of gravity G2 of drawing 3 d to the longest point M2**. Since it is recorded in the same direction as an erect image (drawing 3 c) of a standard which coordinates of a picture were amended like drawing 3 g by change of this coordinate value, and was set up first, an erect image is always displayed on an observer who looks at a display screen, and it is eventually recorded on him.

0071Thus, by the form same even if a taken image rotates as the photographic subject set up as a nominal contour extracting, and detecting the amount of rotation gaps, and amending based on it, A subsequent frame image as well as the first frame image that has the form set up as a standard can always perform the display of an erect image.

0072A nominal contour can be extracted in real time, and since composition is also easy, processing time also has an advantage, like it is short.

0073Although the picture of the rectangle obtained by photography is based on the form of the image pick-up area of said image sensor 2, the case where there is no picture in the corner section of said drawing 3 g may happen, it is black and it is shown typically. Since a pixel number is about 20% higher than the object for NTSC if the part is used as a generating picture portion for NTSC using the image sensor for PAL, although it for NTSC is used for said image sensor, only the part can decrease a black screen. ***** and also a black part can be lessened for the image sensor which the pixel number increased.

0074Here, image rotation processing is good in a line as follows. For example, it is considered as the standard of rotation of the coordinates of the extraction-shaped center of gravity, and the distance from the center of gravity of each picture element is computed, and it rotates from the center of gravity by the angle which rotated, and is considered as new coordinates, and the data of a picture element is moved to the coordinates. Centering on the center of gravity, the position of a picture rotates by the amount of rotation gaps by these operations, and the display of the picture which has always stood erect can be performed.

0075A series of picture information obtained with VTR, an ultrasonic scanner, and an X ray camera, Since it is the same video signal as the aforementioned taken image, an erect image can always be displayed by considering the output signal of the input output means (not shown) which inputs the picture information and is outputted after that as the same processing as the above, operation, and composition via A/D4.

0076Next, a 2nd embodiment is described below using drawing 4. In the figure, the same number shows the thing of drawing 1 mentioned above - drawing 3 and drawing 7 - drawing 9, and the function, and it omits explanation.

0077In drawing 4, including the form of the standard of said 1st standard setting means, 7e extracts the same color or the form of a unique new standard from somewhere else **form / same**, sets up a new normal coordinate, and is such a re-setting means of the standard which repeats operation of new normal coordinate setting out. 7 f of the same area as the shaped surface product of standards, such as said standard re-setting means 7e and said 1st standard setting means 7a, is judged, A 2nd tailing means to perform form tailing, and 7 g of the 2nd direction detecting means that detects the direction of a specific point is built in from the direction of the center of gravity of the normal coordinate value of said standard re-setting means 7e to a specific point, and the center of gravity of the coordinate value of the output form of said 2nd tailing means 7f, An amount detection means of the 2nd rotation gaps to calculate the amount of rotation gaps from the detecting direction, and 7 h are 2nd coordinate correction means to perform coordinate correction of the output form of the 2nd tailing means 7f from the amount of rotation gaps of said amount detection means 7g of the 2nd rotation gaps.

0078Next, operation is described. If the form of a standard where it explained in said 1st embodiment operates a camera and moves to a bread or tilting directions, it may move in the bread or the direction opposite to the direction of a tilt, and, finally may disappear from a camera photographing screen. This embodiment is devised as this measure.

0079First, the program flow of the standard re-setting means part 7e is shown in drawing 10. Since it is not the first processing in which a nominal contour is set up at Step 809 in the figure, the judgment of P= 1 which shows detection directions of a nominal contour is set to NO, and shifts to Step 812 of the 2nd tailing means 7f. The label A of RAM2 of Data Recording Sub-Division of a nominal contour and the form of an identical area are searched from RAM1, the coordinates are memorized on the label M of RAM1, and it shifts to Step 813. If the nominal contour of the label M of RAM1 arrives at the coordinate areas near one end in a screen at this step 813, it will shift to Step 814. The nominal contour of the label M is recorded on the label C of RAM2, the form of another new standard is extracted in the same color to middle of the screen or the end field by the side of the

camera move direction, and as the label B of RAM2, it is recorded and is set as the normal coordinate $F = 1$ of a nominal-contour setting-out flag.

0080What is necessary is to set three kinds of colors as others, and just to extract the form of the same color, when there is no form of a setting-out color to the form of a new standard although Step 814 of the figure is not filled at this time. It cannot be overemphasized that what is necessary is just to repeat color setting when there is no form of a setting-out color, and until it sets up another color and can check existence.

0081By replacing with the judgment of whether the position of the nominal contour of the label M of RAM1 in the judgment of the step 813 is in the coordinate areas near one end in a screen here, and detecting that the migration length of the straight line of form is more than a stipulated amount, It may be used to constitute so that a new photographic subject may be made into a normal coordinate.

0082Since it is shown that it shifts to Step 815 in NO, and tailing form is in the position near middle of the screen etc. by the judgment of the step 803, It records on RAM3 as tailing coordinates, and since it is not a normal coordinate, it sets to the normal coordinate $F = 0$, and it shifts to the 2nd direction detecting means of Step 901 of following drawing 11.

0083In the judgment of the normal coordinate $F = 1$ of Step 901, since **** from said step 814, it is set to YES, and it shifts to the judgment of the label B of RAM2 of the form of the new standard of Step 906.

0084shifting to Step 907 of the direction of YES in the step 906, since it is the label B of RAM2 -- the longest point from the center of gravity of the labels B and C of RAM2, and the center of gravity -- or, The angle to the longest point or the shortest point is calculated centering on the center of gravity, it shifts to Step 908 of the following amount detection means 7g of the 2nd rotation gaps, and the angle-of-rotation difference R0 by camera rotation with the label A of RAM2 of said nominal contour and the label C of tailing form RAM2 is detected from the shortest point.

0085Since the label C of the tailing form RAM2 and the label B of form RAM2 of a new standard are in the screen, said angle-of-rotation difference R0 is calculated to the angle of rotation R01 of the label B of form RAM2 of a new standard ($R01 - R0 = RS$), The degree of reference angle of the label B of form RAM2 of the new standard which is an angle which is in agreement in the nominal-contour direction set up first is set as RS. By the judgment of said step 901, in NO, it shifts to Step 903 and Step 905, and the amount detection of rotation gaps of said tailing form is performed.

0086Next, shift to Step 1002 of the 2nd coordinate correction means 7h of drawing 12, and the form RAM2 label B of a new standard is judged, If YES becomes, it will shift to Step 1003, the coordinates of a picture will be changed in the direction contrary to the move direction of the angle-of-rotation difference R0 (angle which moved from the angle of the first nominal contour) centering on the center of gravity of the form RAM2 label B of said new standard (the label B of RAM2), and a picture will be amended to an erect image. The data of the label B of the RAM2 is transposed to the label A of RAM2, the data storage place of a nominal contour is set as one, and a nominal contour is changed into a new nominal contour.

0087If said step 1002 becomes in NO, the coordinates recorded value of rotation of the same form as a new nominal contour will be changed according to the angular difference R0 of the amount of rotation gaps which shifted to Step 1001 and was detected by the amount detection means 7g of the 2nd rotation gaps, and the form of the new standard of said standard re-setting means part 7e. The erect-image record of each nominal contour or the same form can be carried out because the memory control 10 is controlled by the output which is the 2nd coordinate correction means 7h and records by this each frame image recorded on field memory FM6 on the image memory 11.

0088the following new nominal contour -- said new nominal contour -- the same -- a camera -- a bread -- or, By movement of tilting directions, since it may disappear from a screen, it operates like the above-mentioned, the form of a still newer standard is set up, the angle-of-rotation difference of the setting-out form and the form of said new standard is calculated and detected by said same processing, and it is set as the still newer degree of reference angle.

0089Even if one new nominal contour after another can be set up in the camera move direction and a picture changes continuously with camera movement by repeating such operation, Since a new nominal contour is set up based on the nominal contour of the erect image set up first and the first erect image and the erect image of the direction can always be set to it, a camera moves, and even if it rotates, since an erect image is always obtained, as for a photography person or an observer, a legible picture is acquired.

0090As mentioned above, although the embodiment which sets up a new normal coordinate and carries out tailing and spin compensation in the case where it separates from the area which the photographic subject is observing etc., by the standard re-setting means 7e, the 2nd tailing means 7f, the amount detection means 7g of the 2nd rotation gaps, and the 2nd coordinate correction means 7h was described, Of course, only this form is not the method of the management for an area blank. If it detects that the form where the area currently observed was extracted separates as the example using the function of the standard re-setting means 7e, As explained, the suitable photographic subject in an area is chosen as the point, the label A is again attached to the extraction form of the selected photographic subject like the operation which set up the normal coordinate by the 1st

standard setting means 7a, and it records on RAM2.

0091Thus, if selected extraction form is again made into a normal coordinate, operation of the spin compensation of a picture, etc. will be attained by continuing after that the operation explained by a 1st embodiment, and the completely same operation. Thus, supposing it calls the again selected photographic subject the means made into a normal coordinate, and a normal coordinate resetting means, the operation same only by adding this means to the embodiment of drawing 1 as the embodiment shown by drawing 4 and drawing 6 will be attained.

0092Next, operation of the figure is explained in detail using drawing 5. Drawing 5 a is an extracted image on the basis of the big tree 31, and detects the center of gravity G1, the longest point T1, and the angle R1 by said 2nd direction detecting means. Next, if a camera moves rightward, a picture will be acquired like drawing 5 b. Form is judged by the 2nd tailing means 7f, and the big tree 31 of the picture detects the new center of gravity G2, the longest point T2, and the angle R2 for it by the 2nd direction detecting means, and calculates amount of rotation gaps R1-R2 with front drawing 5 a by the amount detection means 7g of the 2nd rotation gaps. Based on this calculated value, centering on the center of gravity G2 of the big tree 31 of a broken line frame, image rotation of the angle is carried out so that it may be set to R1, spin compensation of the picture is carried out to an angle of the first big tree 31, and an erect image is obtained like drawing 5 d by the 2nd coordinate correction means 7h.

0093In said drawing 5 b, since coordinates of the big tree 31 are near the end on a screen, Ogi 33 of form of the same color of the counter direction is extracted, it is set as a new nominal contour, and center-of-gravity G3, longest point T3, and the angle R3 are calculated simultaneously. It asks for angular difference R3- (R1-R2) of the value, and amount of rotation gaps R1-R2 with front drawing 5 a and the angle R3 of Ogi 33, and an angle equivalent to the angle R1 of the first erect image is obtained. This becomes the degree of reference angle of a new nominal contour.

0094Next, when a camera moves to drawing 5 c, Ogi 33, By angular difference R4-R3- (R1-R2) with reference angle degree R3- (R1-R2) of the new nominal contour which became the center of gravity G4, the longest point T4, and the angle R4, and was set to this value in Ogi 33 of said drawing 5 b. The amount of rotation gaps with the first nominal contour can be detected, and a coordinates recorded value of output form of drawing 5 c is changed into said the appearance. Eventually, erect-image record is carried out like drawing 5 e, and the figure is displayed. Here, an address of the image memory 11 sets up each address (equivalent to each frame) to which the Still Picture Sub-Division record of a camera was corrected from a general address value of the whole memory at the time of an end correspond to said coordinates recorded value and the couple 1.

0095In the case of big form which requires extraction form of a middle-of-the-screen part to an end of a screen, in the above form extraction, Since an end of a screen or coordinates of a specific region are known beforehand, a program is changed by detecting this, extracting form of another color and redoing setting out within extraction form, so that form which is not applied to an end of a screen or form outside a specific region may be obtained.

0096In color setting of picture information, a color information of an extracted image may be detected beforehand as mentioned above, and color detecting operation may be performed by a method of color specification using the detected information. Although angle of rotation of the above form is described from angular difference of the direction of the longest point from the center of gravity of tailing form of the same form as a nominal contour, or the shortest point, it is not what is limited to this -- the first volume of the former and "an Image Processing Display industrial application conspectus", date-of-issue January 17, 1994, and publishing office; FUJI techno cis -- it may realize using a circle element method and a straight-line element method which are indicated to 409 Page.

0097A circle element method pays its attention to the local feature like a hole in circular form here, A circular line is generated so that it may pass along the local feature like a hole centering on the center of gravity of reference circle form and a tailing circle configuration, From an angle of reference circle-shaped partial ****, a change point of a total of two points of partial **** of a tailing circle configuration, and the center of gravity, are the amount of rotation gaps the method of calculating, and a straight-line element method, In a nominal contour which consists of straight lines, it asks for inclination of each line segment of a nominal contour and tailing form, and an intersection of the same line segment is made into the starting point, and although it is the method of making inclination the amount of rotation gaps, it omits for details.

0098Next, 3rd one embodiment is described below using drawing 6. In the figure, the same number shows the thing of above-mentioned drawing 1 - drawing 5, and the function, and it omits explanation.

0099In drawing 6, 7i is a tailing form displaying means, 7j is a calculating means, the amount of rotation gaps of display angle of rotation by directions of key 14 operation or angle of rotation obtained from the gravity sensor, and the above-mentioned nominal contour is calculated, and the direction of an image of a display is controlled.

0100Although a gravity sensor is not illustrated, it cannot be overemphasized that it may be the same as that of what was described in a conventional example (Japanese Patent Application No. 8-319069).

01017k is the direction compensation means of the spin compensation image **calculating means / 7j / coordinates / on a screen** centering on the center of gravity of a nominal contour.

0102Next, operation is described. Before rotating a display surface of a display device, an erect image is specified, the form is extracted, and it is made into a nominal contour at said the appearance. Then, when only a

photography person's direction of a display surface is rotated right 90 degrees, for example, it detects with a photography person's key 14 operation or the output of a display device and said gravity sensor of one, and rotation directions are performed right 90 degrees.

0103In this case, a photography person's key 14 operation or a gravity sensor is used as a direction setting-out means of an image to set up the new direction of an image.

0104A signal detected in this way is inputted into one side of the calculating means 7j of RISC-CPU7. Said erect image is made into form of a standard, and the amount of rotation gaps of the same form is detected and inputted into another side of the calculating means 7j. With the amount of rotation gaps which calculated both inputs, rotation of tailing form where it changed to a rotational display simultaneously with change right 90 degrees by the direction compensation means 7k of an image more delicately than a nominal contour is corrected, and an erect image is displayed on real time by the electrochromatic display displaying means 16. Thereby, even if a photography person rotates a display surface, he can always get an erect image. Since it is corrected to a picture which rotated a display surface 90 degrees by the direction compensation means 7k of an image by the image memory 11, a picture is recorded on it with the value. Since it changes by the direction of a display surface at the time of reproduction even if it records on the image memory 11 by this display surface returned 90 degrees on the contrary, which direction may be sufficient. It does not limit.

0105In extracting the form of said standard after rotation of the display surface of a display device, with a photography person's key 14 operation or a gravity sensor, a rotation indication signal is inputted into one side of the calculating means 7j right 90 degrees, for example, an image is rotated right 90 degrees, and it indicates by erection at a photography person. Then, the form of the standard of the erect image in a display is extracted, and the same treatment as the above-mentioned detects the amount of rotation gaps from a nominal contour. This is inputted into another side of the calculating means 7j of RISC-CPU7.

0106Since the input value of the calculating means 7j is the same before rotating the above-mentioned display surface, said same processing can always obtain an erect image, even if **** and a photography person rotate a display surface.

0107As stated above, even if it sets up a nominal contour before and after directions of display surface rotation, an erect-image display is always obtained.

0108As an example of RISC-CPU7 which performs the above image rotation processing, what processes a pixel in 93 ns (4-bit pixel) /with 14 angle of rotation can be considered.

0109For example, in order for 14 angle of rotation to amend at 8 bits in 250,000 pixels /, according to the data of a monthly "electronic industry material" given in 128 page - 133 pages of the April, 1992 items, 46 or 5 ms of abbreviation starts. Therefore, although it is not enough with this one for the frame period of TV, the real time processing which was enough for the frame period of TV is attained by processing in parallel, using this two or more.

0110Although the interleave scan has described the video signal from an imaging device, it may not limit to this and a non interleave scan may be sufficient. In this case, since what is necessary is just to perform the count of the lengthwise direction address of a screen in order, it cannot be overemphasized that composition becomes easy.

0111As mentioned above, although the embodiment has been described paying attention to pressing down rotation of the photographic subject currently observed on a screen as much as possible, in taking a photograph, it cannot be overemphasized that it does not restrict to this form.

0112For example, for a certain reason, what carries out various motions depending on a photographic subject may be unknown in whether the camera itself which photos whether the photographic subject rotated rotated. Therefore, the correction effects of a certain amount of hand of cut are given, and it may constitute so that the effect of amendment may be made to fade with the passage of time. Hereafter, the embodiment which met this specification is described using the block block diagram of drawing 13.

0113In the figure, the same number shows the thing of drawing 1 mentioned above - drawing 3 and drawing 7 - drawing 9, and the function, and it omits explanation.

01147L is a resetting means of the normal coordinate mentioned above, when extraction form moves out of specific area, resets a normal coordinate to another photographic subject, and continues tailing. If **fixed** there is change of the amount of rotation gaps which 7 m is a correction amount adjustment device, and was detected by the amount detection means 7c of the 1st rotation gaps at all, when large, Fault amendment is prevented by limiting the correction amount in the 1st coordinate correction means 7d to below fixed. By performing the re set of the 1st standard setting means 7a, when the movement magnitude of the extraction form detected by the resetting means 7L of a normal coordinate separates from a fixed quantity from a center. By repeating a re set in high frequency further from the frequency of the re set which the resetting means 7a of the normal coordinate mentioned above was originally controlling, it constitutes so that it may be possible to oppress the blur of the hand of cut of the photographic subject of middle of the screen mostly.

0115Of course, not only middle of the screen but a specific area may be provided, and the start of a re set may be detected, Or it cannot be overemphasized that in the case of the photographic subject which reduced the

correction amount of the rotational amount of gaps as specific area was approached, and separated from the center it may constitute so that it may be made to amend rotation weakness.

Brief Description of the Drawings

Drawing 1The block diagram showing the circuit block of the image display device which is a 1st embodiment of this invention.

Drawing 2The block diagram showing a circuit block in the details of the form extraction means of a 1st embodiment of this invention.

Drawing 3The figure showing the display of the picture of a 1st embodiment of this invention.

Drawing 4The block diagram showing the circuit block of the image display device which is a 2nd embodiment of this invention.

Drawing 5The figure showing the display of the picture of a 2nd embodiment of this invention.

Drawing 6The block diagram showing the circuit block of the image display device which is a 3rd embodiment of this invention.

Drawing 7The flow chart of the 1st standard setting means of a 1st embodiment of this invention.

Drawing 8The flow chart of the 1st tailing means of a 1st embodiment of this invention, and the amount detection means of the 1st rotation gaps.

Drawing 9The flow chart of the 1st coordinate correction means of a 1st embodiment of this invention.

Drawing 10The flow chart of the re-setting means of a 2nd embodiment of this invention, and the 2nd tailing means.

Drawing 11The flow chart of the amount detection means of the 2nd rotation gaps of a 2nd embodiment of this invention.

Drawing 12The flow chart of the 2nd coordinate correction means circuit of a 2nd embodiment of this invention.

Drawing 13The block diagram showing the block of the image display device which is a 4th embodiment of this invention.

Explanations of letters or numerals

1 -- Field memory FM, -- An optical system section, 2 -- An image sensor, 5 -- A camera signal processing part, 6 7 -- RISC-CPU, 7a -- The 1st standard setting means, 7b -- The 1st tailing means, 7c -- The amount detection means of the 1st rotation gaps, 7d -- The 1st coordinate correction means, 7e -- Standard re-setting means, 7f -- The 2nd tailing means, 7g -- The amount detection means of the 2nd rotation gaps, 7h -- The 2nd coordinate correction means, 7i -- A form extraction means, 10 / -- Memory control, 11 / -- An image memory, 16 / -- An electrochromatic display displaying means, 21 / -- A standardizing part, 22 / -- The logical addition part A, 23 / -- The logical addition part B, 24 / -- Filter part A, 25 / -- Filter part B. -- A tailing form displaying means, 7j -- A calculating means, 7k -- The direction compensation means of an image, 8

Drawing 1

For drawings please refer to the original document.

Drawing 4

For drawings please refer to the original document.

Drawing 2

For drawings please refer to the original document.

Drawing 3

For drawings please refer to the original document.

Drawing 5

For drawings please refer to the original document.

Drawing 9

For drawings please refer to the original document.

Drawing 6

For drawings please refer to the original document.

Drawing 7

For drawings please refer to the original document.

Drawing 8

For drawings please refer to the original document.

Drawing 10

For drawings please refer to the original document.

Drawing 11

For drawings please refer to the original document.

Drawing 12

For drawings please refer to the original document.

Drawing 13

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